ON SQUARING A NUMBER AND T-SEMI PRIME NUMBER

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ABSTRACT: *In this short paper, we have provided a new method for finding the square for any positive integer. Furthermore, a new type of numbers are called T-semi prime numbers are studied by using the prime numbers.*

KEYWORDS –*Prime numbers, Semi prime numbers, Mathematical tools, T-semi prime numbers.*

I. INTRODUCTION

It is well known that the field of number theory is one of the beautiful branch in the mathematics, because of its applications in several subjects of the mathematics such as statistics, numerical analysis and also in different other sciences.In the literature, there are many studies had discovered some specific topics in the number theory but still there are somequestions are unsolved yet, which make an interesting for the mathematicians to find their answer. One of these questions is the twin prime conjecture which is one of the problemsin the list of unanswered and also Goldbach's Conjecture. In this study, new formula for squaring a positive integer is given. Then, the relation between the T-semi prime number and the perfect number and the semi prime number is studied.

II. SQUARING A POSITIVE INTEGER

A squaring of a positive integer is a multiple of the number by itself. In [1] Shah provided a method for finding the square of an integer number. New method has been provided in this section for finding the square for any positive integer number which is different and much easier then Shah's method. Furthermore, some examples are given to illustrate the method.

Without loss of generality, set$n$ be any positive integer, let's start with $n = 3$, then

$$(3-1)^2 + (2\cdot 3-1) = 4+5 = 9 = (3)^2.$$

Let $n = 7$, then

$$(7-1)^2 + (2\cdot 7-1) = 36+13 = 49 = (7)^2.$$

Let $n = 10$, then

$$(10-1)^2 + (2\cdot 10-1) = 81+19 = 100 = (10)^2.$$

In general, the square for any positive integer n can be express as $(n-1)^2 + (2n-1).$ Next, some examples are presented to illustrate the method which are given as follows.

Example 1. Consider $n = 37$ and $n = 197$, then

$$(n)^2 = (37)^2 = (37-1)^2 + (2\cdot 37-1) = 1296+73 = 1369.$$

$$(n)^2 = (197)^2 = (197-1)^2 + (2\cdot 197-1) = 38416+393 = 38809.$$

Example 2. Consider $n = 225$ and $n = 350$, then

$$(n)^2 = (225)^2 = (225-1)^2 + (2\cdot 225-1) = 50176+449$$
$$= 50625.$$

$$(n)^2 = (350)^2 = (350-1)^2 + (2\cdot 350-1) = 121801+699 = 122500.$$

Example 3. Consider $n = 2525$ and $n = 33505$, then

$$(n)^2 = (2525)^2 = (2525-1)^2 + (2\cdot 2525-1)$$
$$= 6370576+5049 = 6375625.$$

$$(n)^2 = (33505)^2 = (33505-1)^2 + (2\cdot 33505-1)$$
$$= 1122518016+67009$$
$$= 1122585025.$$

III. T-SEMI PRIME NUMBER

A natural number is called semi prime if it can be written as a product of two prime numbers which are not necessary different such like 4, 6, 10,…. [2]. Thus, this section concern on a type of numbers are called T-semi prime numbers which are given by Alabed and Bashir[3]. By using the prime numbers, we can see the distribution of these numbers among the infinite set of natural numbers.

Now, by usingthe mathematical procedure which is $(2p+1)$ or $(2p-1)$ for the first few prime numbers which are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89 and 97,we have

$2\cdot 2+1=5$	or	$2\cdot 2-1=3$
$2\cdot 3+1=7$	or	$2\cdot 3-1=5$
$2\cdot 5+1=11$	or	$2\cdot 5-1=9$
$2\cdot 7+1=15$	or	$2\cdot 7-1=13$
$2\cdot 11+1=23$	or	$2\cdot 11-1=21$
$2\cdot 13+1=27$	or	$2\cdot 13-1=25$
$2\cdot 17+1=35$	or	$2\cdot 17-1=33$
$2\cdot 19+1=39$	or	$2\cdot 19-1=37$
$2\cdot 23+1=47$	or	$2\cdot 23-1=45$
$2\cdot 29+1=59$	or	$2\cdot 29-1=57$
$2\cdot 31+1=63$	or	$2\cdot 31-1=61$
$2\cdot 37+1=75$	or	$2\cdot 37-1=73$
$2\cdot 41+1=83$	or	$2\cdot 41-1=81$
$2\cdot 43+1=87$	or	$2\cdot 43-1=85$
$2\cdot 47+1=95$	or	$2\cdot 47-1=93$
$2\cdot 53+1=107$	or	$2\cdot 53-1=105$
$2\cdot 59+1=119$	or	$2\cdot 59-1=117$
$2\cdot 61+1=123$	or	$2\cdot 61-1=121$
$2\cdot 67+1=135$	or	$2\cdot 67-1=133$
$2\cdot 71+1=143$	or	$2\cdot 71-1=141$
$2\cdot 73+1=147$	or	$2\cdot 73-1=145$
$2\cdot 79+1=159$	or	$2\cdot 79-1=157$
$2\cdot 83+1=167$	or	$2\cdot 83-1=165$
$2\cdot 89+1=179$	or	$2\cdot 89-1=177$
$2\cdot 97+1=195$	or	$2\cdot 97-1=193.$

From the above we note that, there arenumbers set which is a partial of the natural number set that has two types of numbers, the prime and the T-semi prime numbers which is defined by [3] as a natural number divisible by itself, 1 and one or more prime numbers. Thus, some of the first few T-semi primes are 9, 15, 21, 25 and 35, when $p=$ 5, 7, 11, 13 and 17 respectively. Therefore, we conclude the following results.

Proposition 1: Every perfect number is T-semi prime number.

Proof: Suppose that *k* is a positive perfect number. By its definition, *k* equal to the sum of its factors. Without loss of generality, let $1, l, m$ and n are the factors of*k*, for some $l,m,n\in\mathbb{N}$, then $k=1+l+m+n.$ Since all the known perfect numbers right now are even numbers of the form $2^{p-1}\times(2^p-1)$ where 2^p-1 is Mersenne prime, we conclude that *k* must be even. From the definition of T-semi prime, *k* must divided the prime 2. Therefore, *k* is T-semi prime. $\square$

Remark 1: The convers of the above proposition is not necessary true. For example, 15, 25 and 35 are T-semi prime numbers but are not perfect numbers. Because $15\neq 1+3+5,$ $25\neq 1+5$ and $35\neq 1+7+5.$

Proposition 2: Every semi prime number is T-semi prime number.

Proof: Suppose that m bea semi prime number. By its definition, m equal to the product of two primes which are not necessary different. Without loss of generality, let p,q are two prime numbers, then $m=pq.$ By definition of semi prime number, we have two cases as follows.

Case1: let $p=q,$ then $m=p\cdot p=p^2.$ Thus, we have *p* is a factor for *m* which is prime. By definition of T-semi prime number, *p* divides *m*. Therefore, *m* is T-semi prime number.

Case2: let $p\neq q,$ then $m=p\cdot q.$ Thus, *p* and *q* are factors for *m*, which means that, $p\mid m$, $q\mid m$ and also $p\cdot q\mid m.$ Now, by definition of T-semi prime number, we have *p* and *q* are different primes divides *m*, which give *m* is T-semi prime number. $\square$

Remark 2: The convers of the above proposition is not necessary true. For example, 195 is T-semi prime but not semi prime, because $195=3\times 5\times 13$ and all of 3, 5 and 13 are prime numbers which is contradiction with the definition of the semi prime number. Similarly, for 165.

IV. CONCLUSION

As a conclusion, our new method is valid to give the square for any positive integer number. Furthermore, the obtained results, shows that the perfect and the semi prime numbers are T-semi prime numbers but the convers is not necessary true.

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